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RECENT TRIALS OF REPELLENTS FOR NARCISSUS FLY.

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A trial of a number of substances as repellents against the Narcissus fly *(Merodon equestris)* was made at Victoria, B.C., in 1933. The place selected for these trials was one where the owner had suffered severe losses from *Merodon* in the past, and notwithstanding this had preserved all his badly infested bulbs instead of destroying them as we advised; and further, had even planted them in a separate plot to see if they would recover. The result of this procedure was, as we predicted, an enormous infestation of *Merodon* the following summer and anticipating this we made arrangements to try out various repellents, realizing that here was an unusual opportunity.

The object of the experiments was to make one application only of each repellent and note the result. This because if a repellent is to be of real value from a practical standpoint it should take effect with a minimum number of applications and preferably with only one application. Doubtless many things might be found to be repellent if frequently applied but no grower would find it practicable to do this except in the case of very valuable stock.

The discovery of a really practical repellent which would retain its efficiency for a long period would be of immense value to owners of small gardens where great damage is done to Narcissi by *Merodon* year after year.

In 1933, the season was backward and the flies did not begin to emerge until about the middle of May. The first were seen on May 10 and the first emergence in field cages occurred on May 12. We commenced applying repellents on May 30 and others were applied from time to time as the season progressed, some of them not being used until the middle of June. The emergence of adults was a protracted affair and the number of flies in the field increased very slowly until the middle of June, when following a sudden rise in temperature the rate of emergence increased to a maximum on the 16th and then decreased rapidly until the end of the month when it ceased altogether.

The following were tried as repellents:—

(1) Lime 10 lbs., ialine 1 oz. Mixed in revolving barrel. Applied with a dusting machine to the bases of the plants.

(2) Hydrated lime applied by hand to the bases of the plants.

(3) Home-made summer oil emulsion 1 pint, water 32 pints, ialine 2 oz. Applied with spray pump.

(4) Sulphur applied by hand.

(5) Zinc Oxide applied with duster.

(6) Crude napthalene and powdered coke.

(7) Copper carbonate dusted heavily at the bases of the plants.

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(8) Fir sawdust piled along the rows against the stems.

(9) Fir sawdust 1 bushel, sodium fluosilicate 1 lb. piled along the rows against the stems.

(10) Summer oil emulsion (home-made) 1 pint; water, 32 pints with nicotine sulphate ¾ oz. to every 3 gallons of liquid. Applied in a coarse stream to the bases of the plants by means of a spray pump.

(11) Sodium fluosilicate dust (20 per cent filler) applied with a duster.

As regards the dates when repellents were applied, the end of May appears to have been a suitable time to begin, considering the lateness of the season. After May 30, no further work could be done until June 15 owing to our absence from the city but even at that time some benefit resulted from some of the repellents which were tried. Towards the end of the month little or no benefit resulted from repellents used.

The bulbs were dug during the middle of July and were allowed to dry in trays for ten days or a fortnight, so that the roots could be readily removed. Examination of the bulbs for degree of infestation and results of the experiments was commenced on Aug. 1.

Examination was made by cleaning the basal plate of a bulb with a stiff fibre brush when the entrance holes made by larvae could be seen. This method is more effective than scraping with a knife. Even at a very early stage infested bulbs have a distinctive appearance which is readily recognized after some practice. A slight discolouration is noticeable near the edge of the basal plate and on cutting into this it will be found to extend into the tissue which takes on a reddish colour where it has been mined by the larva.

At this time of year the larvae were found to be very small and in nearly every case had penetrated only a short distance into the bulbs. But a number of bulbs were found with larvae of considerable size and these appear to have carried over from the previous year. This is indicated by the condition of the bulbs in which the damage was far too great to have occurred during the current year.

Evidence of the presence of 2-year-old larvae.

In contradiction to the findings of Miss Bessie Broadbent at Washington (Jour. Ec. Ent. 21, p. 355) and supporting the suggestion of certain British writers, we found in examining the bulbs that there was evidence that a small proportion of the larvae had carried over from the previous year. These larvae were of much larger size than the majority of those found in the bulbs, most noticeably so in fact, and that condition of the bulbs was such that it seemed impossible that so much destruction could have taken place during the current year. These large larvae varied from 11 mm. to 16 mm. or more in length, whereas the majority found in the bulbs on Aug. 14 to 16 ranged from 2.5 to 6 mm. and only occasionally were any found that exceeded that size.

The position in which these large 2-year-old larvae were found was almost invariably in the outer bulb scales or in a side bulb and not in the heart but the bases of the bulbs were severely damaged showing that the larvae had been present for a considerable time.

TABLE OF RESULTS OF REPELLENTS.

Plot	*Application*	*Material used.*	*Sound bulbs.*	*Infected bulbs.*
1	May 30	Lime + ialine	295	55
2	May 30	Hydrated lime	316	67
3	May 30	Summer oil + ialine	314	50
4	June 15	Sulphur	362	212
5	June 15	Zinc Oxide	367	165
6	June 15	Crude Napthalene and coke	580	56
7	June 15	Copper Carbonate	304	243
8(a)	June 16	Sawdust	245	6
8(b)	June 16	Sawdust	313	121
8(c)	June 16	Sawdust	432	92
9	June 16	Sawdust + Na2 SiF6	313	200
10(a)	June 22	Summer oil + BL 40	390	37
10(b)	June 22	Summer oil + BL 40	357	163
11(a)	June 22	Na2 SiF 6 dust	317	145
11(b)	June 22	Na2 SiF6 dust	410	70
12	check	(a)	123	245
13	check	(b)	234	451
14	check	(c)	145	64
15	check	(d)	134	195
16	check	(e)	75	44

The flies prefer to oviposit in bright sunshine and the effect of partial shade is shown in the sawdust trial, Plot No. 8. The lot marked (a) was situated at the west end where the plots were shaded by trees in the afternoon; lot (c) is from the centre and (b) from the east end or sunniest portion of the plot.

The following table gives the results on a percentage basis:—

Plot	*Material*	*per cent infested*
1	Lime + ialine	15.7
2	Hydrated lime	17.4
3	Summer oil + ialine	13.7
4	Sulphur	36.9
5	Zinc Oxide	31.01
6	Crude Napthalene + coke	8.8
7	Copper carbonate	44.4
8	Sawdust (a, b, c)	18.1
9	Sawdust + Na2 SiF6	39.2
10	Summer oil + B.L.40 (a, b)	21.1
11	Na2 SiF6 dust (a, b)	22.8
12 to 16	All check	58.4

Summary.

In these results crude napthalene is outstanding as a repellent even though it was applied as late as June 15. But it caused severe burning, the narcissus foliage turning completely brown within a week after application. Therefore it could not be considered as a remedy unless weaker strengths which would not burn would suffice.

Of the other materials used ialine with lime as a dust or with summer oil as a spray shows distinct promise. Ialine is a brown syrupy fluid smelling strongly of iodoform. It is of English manufacture and was sent for trial as a fungicide and insecticide.

Hydrated lime dusted heavily at the bases of the plants gave decided repellent effect. This material seems to have the most practical value as it can be obtained anywhere, is easily applied and cannot do harm. In correspondence

with Dr. Chas. F. Doucette he informs me that he has obtained similar results at Sumner, Wash., with lime as a repellent.

With sawdust piled along the rows decided repellent effect is shown. Better results might have been obtained if it had been applied earlier.

Sodium fluosilicate caused burning whether used alone or with sawdust. Its action in this respect was not nearly as severe as in the case of napthalene, however.

None of the other materials used caused burning.

The effect of partial shade was overlooked at the commencement of the trials and must be considered in judging the results.

Prevention of oviposition by shading:

Due to the statement by English authorities that the flies dislike ovipositing under any sort of cover and that shading the plants with a loose covering would prevent oviposition, a trial of this method was made.

An entire bed 35 yards long, 5½ feet wide, was covered with cheesecloth stretched on a wooden frame. The cheesecloth hung down at the sides to shade the edges of the bed, but did not reach the surface of the bed so that the covering was open at the bottom. The height of the frame was 18 inches, sufficient to clear the tops of the growing plants. The frame was covered with cheesecloth on May 22, ten days after the first fly had been observed in the open and one week after the first fly had emerged in the laboratory from puparia collected by us at the plots.

Result of examination of bulbs: The bulbs were dug at the same time as the rest and were examined on Aug. 3.

		Sound bulbs.	Infested.
(a)	East end	270	185
(b)	West end (partly shaded)	284	183

Percentage infested 39.9.

While the infestation was less than in the check plots it was evident that the screen did not prevent oviposition to any important degree. There is a possibility that entirely open sides might have been preferable and that the cheesecloth by hanging down at the sides might have imprisoned any flies which emerged from bulbs under the screen, thereby compelling them to oviposit under it.

SOME OBSERVATIONS ON AN OUTBREAK OF THE TWO-STRIPED GRASSHOPPER (MELANOPLUS BIVITTATUS SAY) IN NOVA SCOTIA.

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During the summer of 1931 an outbreak of the two-striped grasshopper (*Melanoplus bivittatus* Say) occurred in localized areas in Nova Scotia on the dyked lands along the Avon River in Hants County and on the Grand Pré dyke lands in Kings County. Reports were also sent in of localized outbreaks in Cumberland and Antigonish Counties, but so far as the writer is aware these terminated in that year. The writer investigated the two first mentioned outbreaks and made careful observations during that season and the subsequent two years when the outbreak finally terminated and feels that certain data should be recorded.

This is apparently not the first time that grasshopper outbreaks have occurred on the historic Grand Pré dyked lands. Older residents of the district intimate that at least two similar outbreaks have occurred within their memory. As nearly as can be determined these outbreaks have occurred at periods about twenty years apart and it may be possible that some meteorological phenomenon is, in a measure, responsible. It appears to the writer that some factor other than the mere vagaries of chance must be responsible for what must otherwise be regarded as a remarkable coincidence that outbreaks of this species should occur simultaneously in widely separated sections in the Province of Nova Scotia, to say nothing of Western Canada and certain sections of the United States. In this connection the paper by the late Norman Criddle[2] on the correlation of sunspot activity with grasshopper fluctuations in Manitoba appears significant.

The two areas mentioned, i.e., the dyked lands along the Avon and at Grand Pré where the infestations occurred, are approximately twelve miles apart. As there are some dyked lands at Hantsport, mid-way between the two points of outbreak, and a considerable amount of high, rough, wooded lands between them, it would appear that there was no connection between the two outbreaks and that each developed independently of the other..

During the summer of 1931 a considerable amount of damage was done in both localities but this became apparent mostly after the hoppers were well developed so that generally speaking the infestation was not particularly severe except on a few areas along the Avon.

In 1932 there was a general increase in both areas and an outbreak also appeared on the dyked lands at Canard, a distance across an arm of the Minas Basin of some three miles in a straight line from Grand Pré. In this year very serious damage was done to crops of hay, grain, roots and potatoes growing on these lands as well as to gardens and crops on the adjacent uplands.

A number of attempts were made to control the hoppers through the application of poison bran baits. Very indifferent results were obtained probably due to the bountiful supply of soft, succulent food available. All formulae suggested in the many references available were tried under what seemed very favourable weather conditions but in no case was more than 50% of the hoppers destroyed.

In July, 1932, shortly after the appearance of adults, in making a survey of the outbreak near Windsor Forks on the Avon dyked lands, there were noted mummified bodies of dead adult grasshoppers with their legs wrapped around the grass stems and with their heads pointing upward. The writer remembered having read an account of a disease causing the death of grasshoppers in this characteristic manner and on looking up the literature it seemed quite certain that death had been caused by the fungus *Empusa grylli* Fr. This identification was confirmed the following year by Dr. D. E. Newton of Macdonald College. A further examination of this locality a few days later indicated that more grasshoppers were dying with the disease. A careful examination of the Grand Pré dyked lands at this time did not result in the finding of any grasshoppers which had died in the manner above described and an attempt was made to transfer diseased grasshoppers from Windsor Forks to Grand Pré. Sweepings of live grasshoppers were made near where the most dead were found and several thou-

sand were transferred to the Kings County dykes. In ten days time dead grasshoppers could be found at Grand Pré, but the writer does not presume to say that the disease would not have appeared without the artificial transfers. Here the disease spread rapidly, the weather being rainy and the humidity high. In places 50 to 90% of the infestation was destroyed within a period of approximately one month and damage to grain fields was greatly minimized.

Transfers of grasshoppers to the Canard dyked lands were not made so early in the season, as it was not known whether or not such steps would be beneficial. When it was found that the disease was becoming established at Grand Pré a careful examination of the Canard dyked lands was made, but there was no evidence of diseased grasshoppers. Consequently, more grasshoppers were collected in the Windsor Forks district, where the infestation was rapidly becoming decimated, and liberated at Canard. By this time the period of rainy weather was over and it was three weeks before dead grasshoppers were found. After this time the dead insects became fairly numerous but never approached the proportions noted on the Avon and Grand Pré dyked lands, where millions of dead hoppers could be found and as many as 18 were counted on one grass stem.

An egg survey in the fall of 1932 intimated that the outbreak on the Avon dyked lands would not be of a serious nature the following year. At Grand Pré localized areas showed a heavy infestation, but there were few eggs deposited in those areas where the disease had been most prevalent, the insects apparently moving to new ground to oviposit. Certain sections at Canard also showed large numbers of eggs.

In 1933 the young hoppers began to appear at Grand Pré about May 20th and by June 1st localized areas seemed almost alive with them. No dead hoppers were found until the 3rd instar nymphs appeared and then only in a very few cases. Quite a number were attacked in the fourth instar, still more in the fifth, but the greatest number were destroyed in the early adult stage. By August 15th the infestation was greatly reduced, not more than 20 or 25% of the grasshoppers being alive after this date.

At Canard there were practically no diseased grasshoppers at any time during the summer, although several attempts were made to transfer the disease by means of sweepings from highly diseased areas at Grand Pré. As the weather was extremely dry during this period, failure to establish the disease may have been due to this cause. It does seem strange, however, that the disease survived the winter at Grand Pré and apparently did not at Canard.

At Canard the hoppers apparently developed normally until they reached the adult stage and did a great deal of damage to hay and grain crops, as well as to garden, potato and root crops on the adjacent uplands. Shortly after reaching the adult stage, however, it became apparent that all was not well with them. They were less active than usual and in a number of ways, not easily definable, did not appear normal. It later became evident that they were not copulating. A farmer said to my assistant one day, as he was making an examination of one area, "There'll be no grasshoppers next year, they're not lockin'." An examination of the interior of the abdomen soon indicated the cause of the trouble; they were infested with round-worms. Specimens submitted to Dr. T. W. M. Cameron

of the Institute of Parasitology, McGill University, were identified as *Agamermis decaudata* Cobb, Steiner and Christie. On August 18th, thirteen specimens of *Melanoplus bivittatus* Say taken at random at Canard were all found to be infested. The number of worms per individual ranged from one to fifteen, the average for the thirteen individuals being 5.5. The worms were confined largely to the abdominal region and the number appeared to be definitely correlated with the development of the reproductive organs. Such an effect has been observed previously[1]. Grasshoppers containing more than two worms showed practically no development of eggs and in many cases the ovaries and testes appeared more or less disintegrated, especially where there were several worms. At this time a few dead grasshoppers could be found lying on the ground, and in practically all cases these were found to be heavily infested with worms, or showing evidence of having been infested, the worms in some cases having left the bodies. Moderately large numbers of both live and dead grasshoppers were examined for the presence of worms and practically all were found to be infested. After this date the grasshoppers died rapidly and the infestation was so reduced that practically no eggs were deposited. It might be interesting to note that the season up to this time was a particularly dry one so that the distribution of the Mermithids would not appear to be limited by such a condition, as was apparently the case with the fungus, *Empusa grylli*.

At Grand Pré the percentage of parasitism from the Mermithids was not so great. However, on September 1st, after a large percentage of the insects had died from the fungus, and also apparently some from being infested with roundworms, about 50% of the live grasshoppers were found to be infested with Mermithids. It was also noted, as observed previously by Glaser and Wilcox [3] in Vermont, that a larger percentage of females than males were infested but the differences were not as great as indicated by them, although observations in this connection were not extensive enough to be conclusive. One female of *M. mexicanus* Saus. taken at Grand Pré on September 1st contained 34 roundworms. Glaser and Wilcox [3] report taking 40 worms from one specimen. Of the few egg-sacs found in the fall survey the number of eggs per sac was considerably below the average. Only 11 egg-sacs were found in 300 examinations (1 sq. ft. earth) at Grand Pré. At Canard no egg-sacs were found in 170 examinations and on the Avon dyked lands only one egg-sac was located in 80 examinations. Consequently, it will be seen that this grasshopper outbreak, which has been of a serious nature for three years, is practically, if not entirely, destroyed. So far as the writer could observe the two parasites mentioned above were almost entirely responsible for its destruction.

Since it is intimated in the literature [1] that certain races of *Agamermis decaudata* may be specific for certain insects, it may be of interest to note that dissections of a number of field crickets, *Gryllus assimilis* Fab., which were numerous in these areas, did not show any worms present.

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(2) Criddle, Norman—The correlation of sunspot periodicity with grasshopper fluctuation in Manitoba. The Canadian Field Naturalist, Vol. 6, No. 9, p. 195, December, 1932.

(3) Glaser, R. W. and Wilcox A. M.—On the occurrence of a *Mermis* epidemic amongst grasshoppers. Psyche, Vol. 25, No. 1, p. 12, February, 1918.

TWO NEW SPECIES OF ELEODES FROM THE PACIFIC COAST REGION (COLEOPTERA: TENEBRIONIDAE.)

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The following new species of Eleodes have recently come to hand and are described as follows:

Eleodes indentata n. sp. (Subgenus **Blapylis** Horn.)

Female—Form ovate, about twice as long as wide, widest across middle of the elytra. Color deep black, luster polished and shining.

Head slightly widest across the eyes, before the post-ocular line a little more than twice as wide as long; sides of the front scarcely as prominent as the eyes, arcuately convergent to the oblique sutures and there broadly sinuate; sides of the epistoma straight and convergent, angles evenly rounded, apex broadly sinuate; frons feebly convex, slightly and broadly impressed within the moderate supra-antennal convexities, very densely punctate, punctures coarse and more or less coalescent, smaller on the occiput. Labrum transverse, densely punctate in apical one-half, thence to base smooth and very sparsely punctate. Antennae moderate in length, almost equal in length to the width of the pronotum; third segment elongate, three times as long as wide at apex and three times as long as the second; segments four to ten inclusive quite equal in length exclusive of the condyles, four to seven equal in width, eight, nine and ten wider, the latter two widest and moniliform, eleventh obovate and truncate at apex.

Pronotum one-half wider than long, widest just behind the middle; apex broadly and feebly emarginate, not beaded, angles not in the least prominent and very obtusely rounded; sides most strongly arcuate at basal third, thence less so and convergent anteriorly, rapidly convergent and almost straight, becoming broadly sinuate and briefly parallel before the subrectangular basal angles. marginal bead fine; base broadly and feebly arcuate, basal bead not very well defined; disk evenly and moderately convex, rather declivous at sides in basal third, densely and irregularly punctate, punctures very coarse, discrete centrally. in contact or separated by distance varying to twice their diameters, intervals slightly convex but not rugose and very sparsely and minutely punctulate, punctures with some coalescence in lateral fourth and not in the least muricate.

Elytra oval, two-fifths longer than wide, strongly convex; base not margined, a little wider than the pronotal base, humeri quite broadly rounded; sides evenly arcuate to the obtusely rounded apex; disk strongly and arcuately declivous laterally and more or less inflexed, apical declivity arcuate and almost vertical, punctures coarse and well indented, not muricate, separated by a distance equal to one-half to twice their diameters, intervals polished, more or less irregularly convex but not rugose.

Epipleura sparsely punctate and more or less irregularly rugose. Sides of the prothorax and prosternum rugoso-punctate. Meso- and metasternum, as well as the parapleura coarsely punctate. Abdomen moderately convex, first three segments more or less longitudinally rugose, sparsely punctate, punctures moderately small, larger laterally and on first segment, more evenly spaced on fifth segment; first segment long, equal to the fourth and fifth together, or twice as long as the third, second equal to the fifth, fourth three-fifths as long as

second, the latter one-fifth longer than the third. Legs moderate in length, metafemora and metatibiae quite equal in length. Metatarsi about two-thirds as long as their tibiae; first segment equal in length to the fourth and twice as long as the second, the latter and third equal.

Male.—Form less robust and narrower. Abdomen broadly impressed in middle third of first three segments and a little more strongly so on the median line, the segments being also more coarsely and more or less rugoso-punctate; fifth segment broadly and feebly impressed. Otherwise in relative proportion of parts and sculpturing as in the female.

Measurements of types: Length 12-13 mm.; width 5.5-7 mm.

Holotype—Female, No. 3908, in the author's collection, Museum of the California Academy of Sciences.

Allotype—Male, in the Canadian National Collection, Ottawa, Ontario.

A series of sixteen specimens were collected on Mt. Ranier, Pierce County, Washington (Wash. Nat. Park), July 20, 1934, by Ralph and George Hopping. Paratypes in the collection of the author and that of Mr. Hopping. One male taken at Easton, Washington (C. V. Riley).

Indentata in facies resembles *tuberculata* Esch., but is differently sculptured and the surface highly polished. The species and varieties can best be differentiated by synoptic statements:

SPECIES BELONGING TO THE SUBGENUS BLAPYLIS HORN.

Sides of the pronotum subangulate, narrowing rather rapidly posteriorly.. 1

Sides of pronotum broadly and rather evenly arcuate, to slightly subangulate, more briefly constricted behind; intervals of the disk as in *tuberculata* Esch. Elytra muricately rugoso-subtuberculate, punctures minute and not indented. Oregon and Washington; Victoria, British Columbia..... .....*rotundipennis* Lec.

1. Pronotal intervals more or less strongly and irregularly convex (subrugoso-punctate) 2

Pronotal intervals feebly convex. Elytral punctures indented between the irregularly convex intervals, not at all muricate, except at the extreme apex. Surface highly polished. Mt. Ranier and Easton, Washington. .....*indentata* new species

2. Elytral sculpturing dense, rough and more sharply defined; pronotum less transverse 3

Elytra moderately strongly, muricately rugoso-subtuberculate, punctures small and not indented. Surface shining. San Francisco Bay and Coastal Regions in Central California. .....*tuberculata* Esch.

Elytra very much less rugoso-subtuberculate, surface throughout smoother; pronotal intervals feebly convex.....var. *sublaevis* Blais.

3. Elytral series more evident when viewed longitudinally, tubercles better defined, surface shining. Near Railroad Flat, Calaveras County, California .....*horrida* Blais.

The subgeneric divisions of the genus *Eleodes* Esch. constitute groups of species possessing certain characters which differentiate them from each other. The subgenus *Blapylis* Horn is based on the tarsal pubescence and correlated genital characters. The subgeneric specific units, by differential characters fall

naturally into groups; these are named after the species which have priority in description and publication. *Indentata* described above belongs to the Cordata Group (1833). The phases referable to the latter group, show farther differential group characters: those having greater affinity with *cordata* Esch. and those with *tuberculata* Esch. These ultimate affinities indicate the genealogical relationships.

Cordata Esch. is a somewhat larger species, with a varying dull luster and the sculpturing is not as coarse as in *tuberculata* Esch. and its related forms. The views expressed from time to time may differ from those given in my Monograph (Bull. 63, U. S. Nat. Mus.). Twenty-five years have passed since that work was given forth and much new material has come to hand since then, which has necessarily resulted in changes in my knowledge regarding species and their relationships.

Eleodes dentipes sordida n. subsp. (**Eleodes** genuina.)

Form of *dentipes* Esch., differing in the sexes, color deep black, sordid in luster and very finely alutaceous.

Female: Form elongate, somewhat robust, subovate, widest at middle of the elytra.

Head before the post-ocular line twice as wide as long, sides subparallel, eyes not more prominent than the sides; front flat, punctures small, discrete, shallow and not well defined, not muricate. Antennae slender, moderate in length, attaining the pronotal base, similar in the sexes, not incrassate; second segment short and annular, third very elongate, twice the length of fourth and five times as long as the second; fourth segment twice as long as wide, five to eleven inclusive about equal in length, five, six and seven equal in width, shorter than four and twice as long as wide; segments eight to eleven slightly wider, eighth triangulo-moniliform, nine and ten moniliform, eleventh obovate.

Pronotum twice as wide as long, apex broadly emarginate, angles small, very acute and everted; sides evenly and strongly arcuate to about basal eighth thence briefly sinuate before the distinct and obtuse angles; disk evenly and not strongly convex, sparsely punctate, punctures small, rather dense, shallow and poorly defined, nor muricate, lateral submarginal area more or less impressed with the surface slightly granulate; base slightly wider than apex.

Elytra elongate oval, about two-thirds longer than wide and three and one-half times as long as the pronotum, widest at middle; humeri obtusely angled and not in the least prominent; base slightly emarginate, very slightly wider than the pronotal base, scutellum very small and triangular; sides broadly and evenly arcuate to the obtusely ogival apex; disk rather feebly convex in the central area, very strongly and arcuately, but not broadly declivous laterally and distinctly inflexed; apical declivity arcuately oblique; surface striate, striae of small, closely placed punctures, not impressed, striae entire, intervals flat, sparsely and very finely punctulate, punctures not muricate except at the extreme apex.

Abdomen moderately strongly convex, finely and sparsely punctate. First segment long, about one-third longer than the fifth, third subequal to the fifth, second about one-third longer than the third and two and one-fifth times as long as fourth. Legs moderately elongate, relatively slender. Metafemora about one-fifth longer than the metatibiae. Metatarsi about one-half as long as their

tibiae; first segment about one-third of its length shorter than the fourth, second and third equal in length.

Male.—More elongate and moderately slender. Elytra more gradually narrowed in apical third, apex more sharply ogival. Abdomen broadly but not strongly impressed in middle third of first three segments; fifth segment longer, equal to one-half the length of first segment. Legs more elongate and slender, notably the metacrura; meso- and metafemora moderately compressed, widest at about apical third, more elongate and two and one-sixth times as long as mesofemora, the latter and profemora equal in length. Metatibiae about one-third longer than the mesotibiae and the protibiae one-ninth shorter than the mesotibiae. Meso- and metatibiae more or less arcuate, notably the latter, subcylindrical, very gradually and but moderately widened to apex, not suddenly widened in apical third as in some of the other subspecies. Otherwise as in the female.

Measurements of types: Length 28-25 mm.; width 10-10 mm.

Holotype—Female, No. 3909, and allotype, male, No. 3910, in the author's collection, Museum of the California Academy of Sciences. A small series collected in Tulare County, California, by Mr. Ralph Hopping. Paratypes in Mr. Hopping's collection.

Sordida is to be recognized from typical *dentipes* Esch. by its very dull, sordid and alutaceous luster, the elytra are distinctly striate and the metacrura notably elongate, the metatibiae are more or less cylindrical and gradually wider in apical one-half. In *paradoxa* Blais. (syn. *montanus* Blais.) the elytra are shining and more coarsely striate, the punctures more or less impressed.

TWO NEW GENERA OF NORTH AMERICAN HEPTAGENIIDAE (EPHEMERIDA)

BY JAY R. TRAVER,

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Through the courtesy of Dr. McDunnough, I have recently been permitted to study many specimens of mayflies allied to the genus Iron, which were collected in Western Canada. Imagoes of both sexes and correctly associated nymphs of several species were included in the material, which was loaned to me from the Canadian National Collection. A study of these specimens, together with others in the Cornell University Collection, convinces me that two new genera are represented, which I designate respectively as *Ironodes and Ironopsis.*

The nymph of *Ironodes* was described and figured by Mrs. Seemann (Jour. Ent. and Zool. 19, 42, Pl. 4, 1927) as *Iron petulans.* As I have indicated in a previous paper, (Jour. N. Y. Ent. Soc. 41, 123, 1933) the imago described by Mrs. Seemann as that of *I. petulans* is in reality a *Rhithrogena,* and the species has been transferred to that genus. The nymph she figures is probably that of *Epeorus californicus* Bks., now placed in the genus *Ironodes.* Besides this species, the genus includes the genotype *nitidus* Etn., transferred from *Iron,* and three new species which are here described. The species *geminatus* Etn. is tentatively placed here, transferred from *Cinygma.*

The genus *Ironopsis* includes the genotype *grandis* McD., transferred from *Iron,* and the new species *permagnus.* Nymphal characters of the genus are drawn from the nymph of *grandis,* which has not been described previously. Specimens

of nymphs of this species were also loaned to me by Dr. McDunnough.

Genus **Ironopsis** gen. nov.

1927—Seemann—J. Ent. and Zool. 19; 42, Pl. 4, figs. 1, 2, 4, 5, 6, 7; nec. fig. 3 (as *Iron petulans.*

1933—Traver—J. N. Y. Ent. Soc. 41, 123 (as 'Nameless genus').

Eyes of male usually not contiguous apically. Posterior margin of head of female quite deeply emarginate. Fore leg of male slightly longer than body. Fore tibia fully 1½ times as long as femur; tarsus about 1½ times as long as tibia. Basal fore tarsal joint slightly longer than or subequal to second, which is subequal to third; fourth somewhat shorter than third, fifth about ½ the length of fourth. In both sexes, hind tibia slightly shorter than femur. Hind tarsus 1-2 to 2-3 of tibia, in male; only 1-2 as long as tibia in female. Basal joint of hind tarsus slightly longer than or subequal to second; third and fourth progressively shorter; fifth equal to third and fourth combined. Claws dissimilar on all tarsi. Typical Heptagenine venation. Basal costal cross veins strong; stigmatic cross veins simple, quite numerous, somewhat aslant. Posterior branch of media in fore wing forms almost a right angle at its union with anterior branch.* Forks of radial sector in hind wing arise at about same point. Media of hind wing forked about 1-3 from base. Apical margin of forceps base of male imago quite regularly undulate. Second joint of forceps often more or less bowed. Penes usually separated almost to base; somewhat compressed, elongate, usually divergent apically, and varying much in appearance according to position. A series of small spines is present on ventral (or inner) surface of each division. Apical margin of subanal plate of female slightly emarginate.

The two-tailed nymph is much like that of *Iron,* but differs in important details. Frontal margin of head slightly emarginate at median line; densely fringed with hairs. Labrum 1½ to 2 times as wide as long; frontal margin widely emarginate in median area; antero-lateral angles very slightly rounded, lateral margins sloping toward base. Inner canine 3-4 to 7-8 as long as outer one; a few hairs in lacinial region. Upper surface of mandible slopes sharply from base of canines to molar surface. A thickened area below molar surface, subparallel to it. Galea-lacinia of maxilla shaped much as in *pulchellum*-group of *Stenonema,* but with a fringe of long hairs along margin next to palp and on upper margin; *no triad of stout spines at tip,* only a few slender straight spines. Glossae of labium slightly concave on their inner margin, strongly convex on outer margin. Median portion of hypopharynx much narrower than either lateral portion, likewise considerably shorter. Pronotum emarginate on frontal margin, lateral margins slightly expanded; an emargination on posterior margin at median line and a smaller one on each side just within postero-lateral angle. *A transverse ridge on pronotum,* one-third of distance from anterior margin, in dorsal area; posterior two-thirds of this sclerite on a higher level than anterior portion. Femoral flange rather short and blunt. Claws with pectinations near apex. Very short blunt postero-lateral spines on gill-bearing segments, none on apical segments. *A row of submedian spines* on each side of tergites 1—9, on posterior margins; each spine arises about one-third from anterior margin. Lamellate portions of gills rather small, obovate; first pair smallest, seventh pair only

*Venation according to Tillyard, 1923.

slightly larger, intermediate pairs largest.

Genotype—*Iron nitidus* Eaton.

Ironodes arctus sp. nov.

Length: Body 9; wing 9½ mm.

Thorax darker red-brown than in allied species; abdominal segments reddish instead of yellowish brown.

Male imago (pinned).—Eyes unusually large for members of this genus; contiguous apically. Head purple-brown. Thorax dark red-brown, mesonotum darker, almost black-brown. Paler red-brown areas on pleura, between wing roots and bases of legs. Depressions on each side of scutella blackish brown. Forelegs reddish brown; femur with yellowish tinge. Apex of fore tibia blackish, likewise tarsal joinings; tarsus deep smoky. Middle and hind legs paler red-brown, with tinge of yellow; tarsi deep smoky; joinings and claws darker. Wings hyaline, venation dark red-brown; stigmatic area *not* brown-tinged. Six to 7 basal costal cross veins; about 9 stigmatic veins, simple, almost straight.

Abdominal segments 2-7 semi-hyaline, light red-brown; the anterior fourth of each segment whitish hyaline, except on sternite 7, so that abdomen appears distinctly banded. Pleural fold red-brown. Posterior margins not noticeably darker or more opaque than preceding area, except very slightly on dorsal portions of tergites. Segments 8-10 opaque, darker red-brown. Tails dark red-brown. Penes as in fig. 3; more slender than in *lepidus* n. sp., and with no such subapical spine as in that species. Second joint of forceps much as in *nitidus* Etn., less curved apically than in *lepidus*. Two small spine-like structures between bases of penes may be artifacts.

Holotype—Male imago (pinned); Winchuck River, Brookings, Oregon, Sept. 9, 1934; No. 3878 in the Canadian National Collection.

Paratype—Male imago (pinned) same data; also in Canad. Nat. Collection.

Ironodes flavipennis sp. nov.

Length; body 9-10; wing 12-13 mm.

A dark brown species; wings distinctly amber-tinted in female, very faintly so in male.

Male imago (pinned)—Head dark red-brown, paler and semi-hyaline along frontal margin; deep red shading on vertex and around bases of ocelli. Eyes large, almost contiguous apically. Thoracic notum and sternum blackish brown with deep reddish tinge; pleura slightly paler red-brown. A conspicuous creamy patch anterior to base of fore wing, containing a narrow reddish streak. Near anterior end of this patch and above fore coxa, a distinct red spot. A smaller creamy patch anterior to base of hind wing. A reddish oblique line anterior to base of middle leg; all coxae with faint reddish shading. Foreleg blackish brown with olive shading; femur somewhat paler than tibia and tarsus, tinged with reddish brown. Femora of middle and hind legs greenish yellow; tibiae dull olive with smoky tinge; tarsi deep smoky, almost blackish. Wings hyaline; venation very dark brown, except longitudinal veins of costal margin, which are amber-brown. Stigmatic area tinged with smoky brown; remaining portion of costal margin rather faintly amber-tinged; remainder of wing even more faintly tinted with very pale amber.

Plate 2

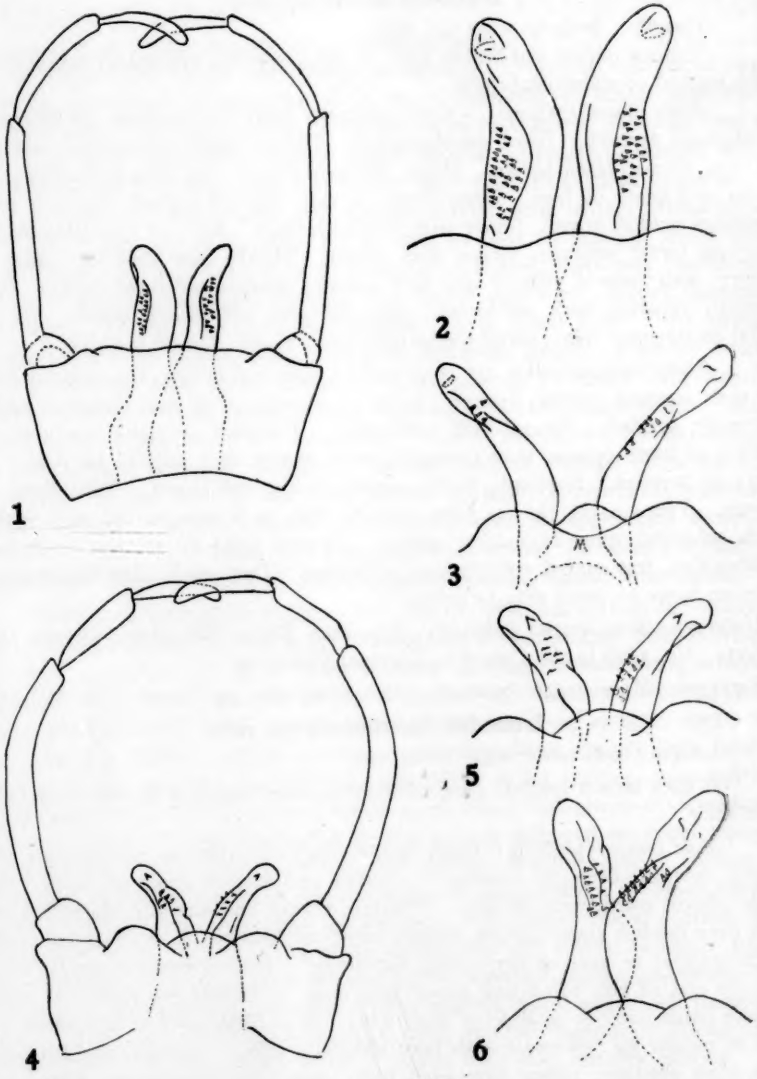


Fig. 1—Male genitalia of *Ironopsis permagnus* n. sp. Fig. 2—Enlarged penes of same. Fig. 3—Penes and apical margin of forceps base of *Ironodes arctus* n. sp. Fig. 4—Male genitalia of *Ironodes lepidus* n. sp. Fig. 5—Enlarged penes of same. Fig. 6—Penes and apical margin of forceps base of *Ironodes flavipennis* n. sp.

Abdominal segments 2-7 semi-hyaline, dark brown with faint red-brown tinge. Anterior margins slightly paler, more yellowish (not true of paratype). Posterior margins opaque, deeper brown. Pleural fold narrowly dark brown. Segments 8-10 opaque; somewhat deeper brown than preceding portions. Sternite 9 brighter red-brown. Tails and genitalia deep black-brown. Penes as in fig. 6; somewhat smaller than in *nitidus* Etn., the small ventral spines rather less numerous and much less conspicuous. Second joint of forceps slightly more bowed in middle region than in *nitidus*.

Female very similar to male, except as noted. Head yellowish brown on frontal and posterior margins, elsewhere quite bright red-brown with distinct red tinge. Wings quite uniformly tinted with rather deep greenish amber. Red markings on pleura more prominent, consisting of red spot above fore coxa and similar red spots anterior to middle and hind coxae. Abdominal segments 2-6, and basal portion of 7, blackish brown (probably semi-hyaline after eggs are discharged). Segments 8-10, and apical portion of 7, paler red-brown; lateral margins of tergites may have yellowish tinge. A narrow dark area usually remains in mid-dorsal area and above the pale lateral margin. Tails blackish brown at base, somewhat paler smoky brown beyond. Body 9½-10, wing 14-15 mm.

Holotype—Male imago (pinned)—Summerland, B. C., May 5, 1933 (A. N. Gartrell); No. 3877 in Canadian National Collection.

Allotype—Female imago (pinned)—Summerland, B.C., May 16, 1933 (A. N. Gartrell); in Canadian National Collection.

Paratypes—10 males imagoes, 20 female imagoes; Summerland, B. C.; May 3-16, June 4-13, 1933; Apr. 9-30, May 11-30, 1934; Oliver, B. C., May 29, 1934; Keremeos, B. C., July 14-28, 1934; Peachland, B. C., July 4, 1934 (A. N. Gartrell). 8 males, 18 females, in Canadian National Collection; 2 males, 2 females, in Cornell Collection, No. 1370, 3-6.

Body of nymph very deep red-brown, almost blackish brown, dorsally. Legs concolorous with body, all joints equally dark; a whitish mark in basal portion of each femur, consisting of a triangular area joined to base by a narrow line. Median line of thorax narrowly creamy; indistinct pale markings on mesonotum. Faint traces of pale submedian lines on abdominal tergites, in line with submedian apical spines; most distinct on 10, convex, the curved portion turned toward median line. Thoracic sternum creamy; brownish areas on median and posterior portions of pro- and mesosterna. Abdominal sternites yellowish. 8 and 9 pale red-brown; lateral red-brown streaks on each, near pleura fold; anterior margins and oblique submedian streaks indistinctly darker. Gills largely purplish black; a paler streak just inside anterior margin; tracheae indistinct.

Ironodes lepidus sp. nov.

Length: Body 8-9; wing 9-9½ mm.

Quite similar to *nitidus* Etn., but smaller; a small spine-like structure is present near apex of each division of penes.

Male imago (pinned)—Head pale red-brown in frontal portion; a very narrow creamy line below base of antenna; area around bases of antennae and ocelli, and vertex of head, quite bright red-brown. Thorax red-brown with tinge of olive. Narrow yellowish streaks anterior to fore wing, below wing bases,

and above bases of middle and hind legs. Very narrow blackish oblique line posterior to each coxa; apical margins of coxae and trochanters deep red-brown. Pronotum shaded with smoky brown. Legs light red-brown; tarsi smoky, or shaded with olive brown. Apex of fore tibia, tarsal joinings and claws somewhat darker. Wings hyaline; venation dark red-brown. Stigmatic area with pale brownish tinge. About 7 basal costal cross veins; 4 or 5 between bulla and stigma; 10 to 11 stigmatic veins, simple and very slightly aslant.

Abdominal segments 2-7 semi-hyaline; yellowish brown with slight olive tinge. Anterior margins narrowly pale hyaline, on tergites and sternites, producing an indistinct banded appearance. Posterior margins narrowly opaque; a blackish area on this margin, in dorsal portion of each tergite. Tracheae outlined in brownish black; the main trunk forms a continuous dark wavy line along pleural fold. Segments 8-10 opaque, slightly deeper in color than preceding segments, and with a reddish tinge; pleural fold narrowly creamy. Tails and genitalia reddish to live brown. Penes as in figs. 4 and 5; near apex of each division is a small spine-like structure, not present in any other species of this genus. Numerous small spines on ventral surface, as usual.

Specimens in alcohol differ as indicated. Thorax darker red-brown; yellow markings less distinct, blackish pencillings more pronounced. Fore tarsus yellowish. Pale anterior margins of abdominal segments less conspicuous.

Holotype—Male imago (pinned); Silver Canyon, White Mts., Calif.; May 10, 1926 (J. O. Martin); in collection of California Academy of Science.

Paratypes—8 male imagoes (6 pinned); same data. 4 in collection of Calif. Acad. of Science; 4 in Cornell University collection, No. 1335. 3-6.

Genus **Ironopsis** gen. nov.

Eyes of male large, contiguous apically. Posterior margin of head of female somewhat emarginate. Posterior margin of pronotum deeply excavated in median area. Foreleg of male considerably longer than body. Femur about 3/4 as long as tibia. Basal fore tarsal joint subequal to second; 3rd slightly longer than 2nd; 4th subequal to 2nd; 5th about 1/2 as long as 4th. In both sexes, basal tarsal joint of third leg subequal to 2nd; 3rd and 4th joints subequal. shorter than 2nd; 5th equal to 2nd and 3rd combined. Claws dissimilar on all tarsi. Typical Heptagenine venation. Stigmatic cross veins more or less strongly anastomosed, forming two distinct rows of cells in *permagnus* n. sp. A rather long intercalary may be present in between Cu_1 and first set of paired intercalaries. Forks of radial sector in hind wing arise at about the same point. Apical margin of forceps base in male imago with rounded lateral projections, or more regularly undulate. Penes rod-like, divergent apically, bearing a cluster of small spines on ventral surface some distance below apex. Apical margin of subanal plate of female with a V-shaped median cleft.

Nymph very similar to that of *Iron (longimanus* group). Frontal margin of head very slightly emarginate at median line. Canines wider and blunter than in *Iron;* a row of hairs on each mandible, in lacinial region. Two thickened portions on each mandible, below molar region; one parallel to this region, the lower one at right angles to molar surface. Glossae of labium somewhat conical, divergent apically. A triad of stout spines at tip of galea-lacinia, as in *Iron.* Labrum deflexed; its antero-lateral angles angulate, not rounded as in *Iron;*

lateral margins slope inward toward base; frontal margin almost straight, very slightly emarginate at median line. Three lateral pectinations near apex of each claw. Antero-lateral margins of pronotum rounded. Extensions of postero-lateral margins of abdominal segments very short and blunt, much less developed than in any known species of *Iron*. *A prominent ridge of rather long hairs is present along mid-dorsal line* of all tergites. Gills of first pair very large; anterior lobes greatly expanded, meeting beneath body of nymph. Gills of seventh pair also meet beneath body. Intermediate pairs very well developed, much as in *Iron*. Tails two.

Genotype—*Iron grandis* McDunnough.

Ironopsis permagnus sp. nov.

Length: Body 13-15; wing 17-19 mm.

Larger than *grandis* McD., and with darker mesonotum; spining on ventral surface of each division of penes much more extensive.

Male imago—Head deep brown; no dark band on frontal margin, but black shading around bases of antennae and on each side of median carina. Thorax almost unicolorous black-brown. A single short black streak anterior to wing roots, along lateral margin of mesonotum, but no indication of a second dark streak extending down to base of foreleg, as in *grandis*. Area anterior to wing root paler, often yellowish, as in *grandis*. Fore femur black-brown, pale brown at extreme base. Fore tibia and tarsus very deep red-brown, almost blackish. Middle and hind legs light red-brown; femora shaded extensively with blackish; tarsi slightly deeper in color than tibiae. Coxae and trochanters of all legs tipped with blackish. Wings hyaline. Costa, subcosta and radius yellowish at extreme base, as is the costa also in its apical third; remaining portion of these veins dark reddish to purplish brown, thickened. Other longitudinal veins finer, pale reddish brown; cross veins somewhat finer than longitudinals, yellowish to light red-brown. 11 to 12 basal costal cross veins, very faint; humeral cross veins pale. Stigmatic area faintly brown-stained; cross veins much anastomosed. All veins of hind wing fine, pale.

Abdominal tergites largely yellowish to olive brown. Tergites 2 and 3 largely occupied by large somewhat rectangular blackish brown patches, which leave all margins and a narrow median line pale. Dark central areas on tergites 4 and 5 more restricted, the margins quite irregular; wider pale lateral areas next to pleural fold, antero-lateral margins also pale, but mid-dorsal pale line more or less obscured. Tergites 6-8 with a black-brown median triangle, based on anterior margin, its apex extending backward along median line about 3/4 the length of each tergite, leaving large triangular postero-lateral areas pale except for a small rounded brown mark on each, above and slightly anterior to the spiracular area. Lateral extensions from the median triangle may reach to this dark mark. Tergites 9 and 10 more reddish brown, the anterior margins narrowly black; a black lateral spot on 9 above pleural fold; median line and median areas of posterior margin of 10 blackish. Sternites olive brown; basal ones shaded with reddish brown. Intermediate sternites with a rounded smoky spot near each antero-lateral angle, the two spots on each sternite connected by a smoky transverse band across the anterior portion. Sternite 8 shaded with red-brown; 9 deeper red-brown, but posterior and postero-lateral margins greyish.

Pleural fold greyish on all segments. Tails deep red-brown, almost black-brown at base, joinings narrowly paler. Forceps deep red-brown, apical joints rather paler; penes light red-brown. Many small spines on ventral surface of each division of penes, as in figs. 1 and 2.

Holotype—Male imago; Cloud Cap Inn, Mt. Hood, Oregon, Aug. 20, 1927; Prof. H. A. Scullen. No. 1334.1 in Cornell University collection.

Paratypes—4 male imagoes, same data. No. 1334.3-6 in Cornell University collection.

Distinguished from *grandis* McD. as indicated above.

SPIDERS FROM THE LAC ST. JEAN REGION OF QUEBEC

BY C. R. CROSBY AND HELEN M. ZORSCH,
Cornell University, Ithaca, New York.

A week's vacation in the delightful Lac St. Jean country netted an interesting list of spiders. No attempt was made to make a general collection. We were primarily interested in the Linyphiidae and collected mostly by sifting moss and forest litter.

At Bagotville we sifted moss on the wooded cliffs overlooking Ha-Ha Bay and in a little marecage nearby. These specimens are dated July 26, 1934.

Dictynidae.

Callioplus euoplus B. & C., 2 ♀.

Gnaphosidae.

Zelotes ater Hentz (*subterraneus* Koch) 1 ♂

Theridiidae.

Theridion sexpunctatum Em., 1 ♀

Linyphiidae

Bathyphantes nigrinus West., 2 ♀

Lepthyphantes alpina Em. 2 ♀ (formerly under Bathyphantes)

Lepthyphantes zebra Em. 1 ♀ (formerly under Bathyphantes)

Linyphia marginata C. Koch. 1 ♀

Microneta persoluta Cambr., 1 ♀

Ceraticelus fissiceps Cambr., 2 ♂ 4 ♀

Ceraticelus laetabilis Cambr., 1 ♂ 7 ♀

"Lophocarenum" bicarinatum Em. 3 ♂ 3 ♀

We append a new description and figures of this interesting species.

Cochlembolus pallidus Em., 1 ♀

Grammonota pictilis Cambr. 4 ♀

"Tmeticus" truncatus Em., 1 ♂ 2 ♀

"Tmeticus" bidentatus Em., 10 ♀

"Tmeticus" montanus Em., 6 ♂ 10 ♀

Tapinocyba simplex Em., 7 ♀

The tide at Ha-Ha Bay at Bagotville has a range of about seventeen feet. While collecting under stones far below high tide we found a considerable number of adult females accompanied by their egg cocoons, belonging to the genus *Erigone* s. s. In one case the spider was actually engaged in spinning the cocoon. No males were found. The tide began to come in and we were forced to abandon the search, hoping to return later. The only opportunity we had to

revisit the place was after our return from Lac St. Jean. The tide was in and the place where the collecting was done was under seven or eight feet of water. Unfortunately it is a very difficult matter to determine females in the genus *Erigone*. It would be very interesting, indeed, to know what species it is that lives in such a peculiar situation.

Argiopidae.
Neoscona arabesca Walck., 1 ♂
Thomisidae
Oxyptila americana Bks., 1 ♀
Clubionidae.
Agroeca ornata Bks., 1 ♀
Clubiona riparia L. Koch, 6 ♀
Agelenidae.
Cryphoeca montana Em. 4 ♀
Hahnia agilis Keys., 1 ♂
Lycosidae.
Lycosa pratensis Em., 2 ♀
Pardosa groenlandica Thor., 1 ♂ 2 ♀
Pardosa mackenziana Keys., 1 ♀
Pardosa xerampelina Keys., 1 ♀
Salticidae.
Neon nellii Peck., 1 ♂ 5 ♀
Opiliones
Caddo agilis Bks., 24 spec.
Odiellus pictus Wood., 2 spec.

The spiders collected at Ile d'Alma on July 28, 1934, were found on the beach at Lac St. Jean and in the swamp region just back of the shore.

Dictynidae.
Callioplus euoplus B. & C., 1 ♀
Callioplus tibialis Em., 2 ♀
Linyphiidae.
Bathyphantes nigrinus West., 1 ♂ 19 ♀
Ceratinella brunnea Em., 1 ♂ 3 ♀
Cornicularia clavicornis Em., 2 ♀
Lophomma sylvaticum Em., 1 ♂
"Tmeticus" concavus Em., 1 ♀ 2 ♀
"Tmeticus" bidentatus Em., 1 ♀
"Tmeticus" montanus Em., 3 ♂
Mimetidae.
Ero furcata Vil., 3 ♀
Lycosidae.
Pardosa groenlandica Thor., 1 ♂ 1 ♀
Opiliones.
Odiellus pictus Wood., 4 spec.

Near the Laurentide National Park south of Hebertville. Our specimens were found in boggy areas on hillsides and on the banks of La Belle Rivière. They are dated July 29, 1934.

Dictynidae.
Amaurobius borealis Em., 1 ♀
Callioplus tibialis Em., 2 ♀
Theridiidae.
Enoplognatha marmorata Htz., 1 ♂
Linyphiidae.
Bathyphantes nigrinus West., 1 ♀
Linyphia phrygiana C. Koch, 1 ♀
Cathabrithorax plumosus Em., 1 ♂
Ceratinella brunnea Em., 2 ♂ 2 ♀
Ceraticelus atriceps Cambr., 2 ♀
Ceraticelus fissiceps Cambr., 1 ♂ 6 ♀
"Tmeticus" bicarinatus Em., 1 ♂
Cornicularia communis Em., 1 ♀
Dismodicus decemoculatus Em., 3 ♀
Grammonota gigas Bks., 1 ♀
Grammanota pictilis Cambr., 1 ♀
"Tmeticus" bidentatus Em., 8 ♀
"Tmeticus" thoracicus Em., 1 ♂
"Tmeticus" montanus Em., 15 ♀
Tapinocyba simplex Em., 7 ♂
Agelenidae.
Cryphoeca montana Em., 1 ♀
Hahnia brunnea Em., 1 ♀

On July 29, 1934, one species was found on the beach at St. Gedeon.

Argiopidae.
Araneus patagiatus Cl., 1 ♂

Near St. Joseph d'Alma in a dry woods and along the river the following specimens were collected on July 30, 1934:

Theridiidae.
Robertus riparius Keys., 1 ♀
Theridion aurantium Em., 2 ♀
Theridion zelotypum Em., 4 ♀
Linyphiidae.
Microneta persoluta Cambr., 1 ♀
Stylophora pullata Cambr., 1 ♀
Ceratinella brunnea Em., 3 ♀.
Ceraticelus atriceps Cambr., 2 ♂ 2 ♀
Ceraticelus fissiceps Cambr., 2 ♂ 7 ♀
Ceraticelus laetabilis Cambr., 1 ♀
"Tmeticus" montanus Em., 1 ♀
Argiopidae.
Neoscona arabesca Walck., 1 ♂
Tetragnatha extensa Linn., 2 ♀
Mimetidae.
Ero furcata Villers, 1 ♀

Thomisidae.

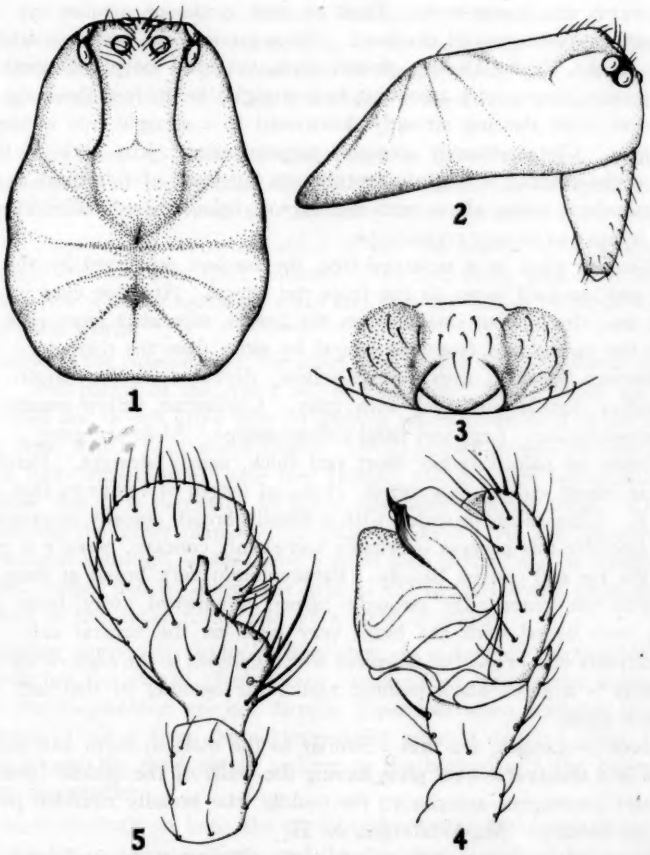
Xysticus borealis (*pulverulentus* Em.) Keys., 1 ♀

Agelenidae.

Hahnia cinerea Em., 2 ♂ 1 ♀.

Lycosidae.

Pardosa groenlandica Thor., 2 ♀ (Emerton).



"Lophocarenum" bicarinatum: 1, ♂ cephalothorax, dorsal view; 2, ♂ cephalothorax, lateral view; 3, ♀ epigynum; 4, ♂ palpus, mesal view; 5, ♂ palpus, dorsal view.

Salticidae.

Dendryphantes marginatus Walck., 1 ♂

Opiliones.

Caddo agilis Bks., 1 spec.

Odiellus pictus Wood., 1 spec.

"Lophocarenum" bicarinatum Emerton

Lophocarenum bicarinatum Emerton. Conn. Acad. Sci. Trans. 18:214, pl. 1, fig. 8, 1913.

Male. Length, 1.1 mm. Cephalothorax reddish orange yellow suffuse with gray and with darker radiating lines and a Y-shaped gray mark at the cer vical groove; viewed from above evenly rounded on the sides with a distinc constriction at the cervical groove, head broad in front, nearly straight across only slightly rounded. The cephalic lobe broader in front, bounded by distinc ridges on the sides slightly converging posteriorly; in front these ridges tur down towards the lateral eyes. Back of each posterior median eye a distinc groove extends to the top of the head. These grooves are best seen when viewe from in front. Cephalothorax viewed from the side steeply ascending to th cervical groove, then gently ascending in a straight line to just above the posterio median eyes, then slanting strongly downward in a straight line to the anterio median eyes. Clypeus nearly straight, perpendicular. Just back of the latera eyes the cephalothorax is slightly protuberant but back of this there is a distinc depression which unites above with the furrow below the cephalic ridge. Ther does not appear to be any cephalic pit.

Posterior eyes in a recurved line, the median separated by the diamete and one and one-half times as far from the lateral. Anterior eyes in a slightl recurved line, the median smaller than the lateral, separated from each other b less than the radius and from the lateral by more than the diameter.

Sternum blackish over orange-yellow, darker towards margin. Endite orange-yellow lightly suffused with gray. Chelicerae yellow-orange, smooth, nearly perpendicular. Legs and palpi yellow-orange. Abdomen gray.

Femur of palpus rather short and thick, nearly straight. Patella nearl as thick as femur, curved downward. Ratio of length of femur to that of patell as 10 to 6. Tibia short, provided with a basally broad, apically acuminate dorsa process; laterally this process is broadly and evenly concave, mesally it is concav towards the tip and convex basally. Paracymbium very broad at base, strongl curved with the outer edge strongly turned downward away from the bul Tegulum very broad with the bezel very high on the ventral side. Embol division consists of a broad flat tail-piece which extends to the edge of the tegulum; the embolus is a short black pointed tooth; the opening of the duct is at th side of this tooth.

Female.—Length, 1-2 mm. Similar to the male in form and color . Th epigynum is a transverse oval plate having the walls of the middle fovea mesall concave and convergent anteriorly; the middle lobe broadly rounded posteriorly.

Type locality: Mt. Whiteface, N. H.

Maine: Van Buren, July 10, 1914, 1 ♂ (Emerton col. and det.); Presqu Isle, Aug. 26, 1925, 5 ♂ 7 ♀.

New York: Chapel Pond, Essex Co., Oct. 20, 1934, 2 ♂.

Ontario: Turkey Point, June 11, 1933, 1 ♂.

Quebec: Bagotville, July 26, 1934, 4 ♂, 3 ♀; Hebertville, July 29, 193 1 ♂.

Date mailed, Feb. 4th, 1935.